

STUDY REPORT

1. Title: Acute Bacterial Meningitis in Thai Children

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Objective In recent months there have been a number of fatal cases of bacterial meningitis in children at Children's Hospital, Bangkok, Thailand. Physicians indicated that clinical courses and autopsy findings suggested bacterial etiology but the causal agent(s) were unknown. The objectives of this study are to determine the etiology of these infections, determine the antibiotic sensitivities of the causal agents and compare 3 antimicrobial regimens for the treatment of these patients.

Description All patients with suspected bacterial meningitis admitted to Children's Hospital were included in this study. Antimicrobial therapy was based on order of admission. Daily administration consisted of (1) 10 megaunits of intravenous penicillin G sodium plus 50 mg/kg of intramuscular kanamycin sulfate or (2) the same dosage of penicillin plus 100 mg/kg of intramuscular chloramphenicol or (3) 150 mg/kg of intravenous sodium ampicillin. All regimens were divided into 4 doses which were given at 6 hour intervals.

Diagnostic lumbar punctures were made on the first day of hospitalization and spinal fluids were examined for appearance, protein, sugar and chloride content, cell counts and differentials, and bacteria revealed by gram stains and cultures. Other procedures included routine blood counts, urinalyses, stool examinations in patients with diarrhea, blood sugar determinations and bacteriological cultures of throat swabs and blood.

Response to therapy was evaluated by the usual clinical criteria, including duration of fever, improvement of neurologic status, and decrease in peripheral blood leucocyte count with a return of the differential count toward normal and improvement in C.S.F. findings (including pressure, cell count, percentage of polymorphonuclear leucocytes, and glucose and protein content). Outcome of therapy will be evaluated according to the patient's course in the hospital, clinical status at the time of discharge and, whenever possible, a follow-up study one year after discharge.

Progress Bacterial isolates from CSF by age and sex are shown in Table 1. Most patients were less than one year old and were seriously ill when they arrived at the hospital (Table 2). All had high CSF cell counts and, in 7 of the 12 cases of pneumococcal meningitis, there was concomitant septicemia (Table 3). Antibiotic sensitivity studies as determined by tube dilution tests indicated that all isolates of pneumococci were very sensitive in vitro to penicillin and ampicillin and all but 2 isolates were sensitive to 1.56 mcg/ml

of chloramphenicol. All isolates of H. influenzae were sensitive to chloramphenicol and ampicillin and slightly sensitive to kanamycin. All strains were resistant to penicillin G. All isolates of pneumococci and H. influenzae were resistant to sulfadiazine—a drug used routinely in combination with penicillin and chloramphenicol for cases of bacterial meningitis at Children's Hospital. Possible drug reactions or complications of therapy were not noted. A detailed analysis of the results of therapy will await completion of the study.

Summary A study of acute bacterial meningitis in Thai children has been initiated. Results to date indicate that the causal agent is D. pneumoniae or H. influenzae in most cases. While all isolates of D. pneumoniae were sensitive in vitro to antibiotics in each regimen, the mortality rate was 75%. Presumably this was because the children were seriously ill when first brought to the hospital. The mortality rate of patients with H. influenzae meningitis was 27.3%. There are too few patients in each group to enable meaningful comparisons of therapeutic regimens at this time.

Table 1. Acute Bacterial Meningitis—Bacteria Isolated from Cerebrospinal Fluid by Age & Sex

Bacteria Isolated	Sex	Total Patients	< 6 Months	6–12 Months	1–2 yrs	2 yrs	Discharged	Expired
<u>Diplococcus pneumoniae</u>	Male	8	5	2	0	1	2	6
	Female	4	1	3	0	0	1	3
<u>Haemophilus influenzae</u>	Male	4	1	3	0	0	3	1
	Female	7	3	4	0	0	3*	2
Others	Male	3	2	0	1	0	2	1
	Female	1	0	0	1	0	1	0
No growth from CSF	Male	7	3	1	0	3	3*	2
	Female	1	0	0	1	0	1	0
Totals		35	15	13	3	4	16	15

* 4 cases were still hospitalised on 31 March 1968

Table 2. Effect of Antimicrobial Therapy on *Haemophilus influenzae* and *Pneumococcal Meningitis*

Organisms Isolated from Cerebrospinal Fluid	Therapy	Clinical Status on Admission to Hospital*			Non Survivors		Survivors			Status on Discharge†	
		++	+++	++++	No.	Period Hospitalized Prior to Death (Average)	No.	Average Duration of Temp 38°C (Days)	Duration of Hospitalization (Days)	Residual	No Residual
<u><i>Haemophilus influenzae</i></u>	Penicillin + Kanamycin			5	1	36 hrs	4	3	34	2***	2
	Penicillin + Chloramphenicol	1		3	1	3 hrs	3**	3	20	0	2
	Ampicillin			2	1	24 hrs	1**	—	—	—	—
<u><i>Diplococcus pneumoniae</i></u>	Penicillin + Kanamycin		1	4	4	32 hrs	1	12	36	0	1
	Penicillin + Chloramphenicol			6	5	24 hrs	1	1	22	0	1
	Ampicillin	1			0	—	1	10	22	0	1

* One or more of the symptoms listed below

++++ Coma, shock or semi-coma

+++ Convulsions without coma or shock

++ Temp 40 C, symptoms for 5 days, complicating disease (s)

** Still hospitalized on 31 March

1 patient with hydrocephalus and

1 patient with localized neurological damage to hand.

Table 3. Acute Bacterial Meningitis Isolation of Organisms from Various Sites

Organism Isolated	Isolation Sites			
	CSF only	CSF & Blood	CSF, Blood & Nasopharynx	Total Patients
<u>Diplococcus pneumoniae</u>	5	5	2	12
<u>Haemophilus influenzae</u>	10	1	0	11
<u>Neisseria meningitidis</u>	0	1	0	1
Group A Streptococcus	1	0	0	1
<u>Salmonella tennessee</u>	1	—	—	1
<u>Pseudomonas spp.</u>	1	—	—	1